Racial Differences in Diagnosis, Treatment, and Clinical Delays in a Population-Based Study of Patients with Newly Diagnosed Breast Carcinoma

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BACKGROUND. Few studies have addressed the issue of whether delays in the interval between medical consultation and the diagnosis and treatment of breast carcinoma are greater for African American women than for white women. The authors examined differences with respect to these delays and analyzed the factors that may have contributed to such differences among women ages 20–54 years who had invasive breast carcinoma diagnosed between 1990 and 1992 and who lived in Atlanta, Georgia.

METHODS. A total of 251 African American women and 580 white women were interviewed and had their medical records reviewed. The authors estimated racial differences in delay times and used polytomous logistic regression to determine the contributions of various factors (socioeconomic and other) to these differences.

RESULTS. Although most women in both groups were treated within 3 months of initial consultation, 22.4% of African American women and 14.3% of white women had clinical delays of > 3 months. Compared with white women, African American women were more likely to experience delays in diagnosis and treatment. Access to care (as represented by method of detection and insurance status) and poverty index partially accounted for these differences in delay time; however, racial differences in terms of delayed treatment and diagnosis remained even after adjustment for contributing factors.

CONCLUSIONS. The findings of the current study suggest that among women ages 20–54 years who have breast carcinoma, potentially clinically significant differences in terms of delayed diagnosis and treatment exist between African American women and white women. Improvements in access to care and in socioeconomic circumstances may address these differences to some degree, but additional research is needed to identify other contributing factors. ***Cancer* 2004;100:1595–604.**
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It is estimated that 211,300 women will have been diagnosed with breast carcinoma in the United States in 2003, with approximately 40,000 women dying of this disease.[1] Overall, African American women are less likely than white women are to be diagnosed with breast malignancy, but they also are more likely to die of such malignancy. Among women age < 40 years, breast carcinoma incidence and mortality rates are higher for African American women compared with their white counterparts.[1]

Differences among racial and ethnic groups in terms of access to care, disease stage at presentation, tumor biology, socioeconomic circumstances, cultural beliefs, and treatment have been suggested as possible contributors to differences in breast carcinoma mortality.[2–27] The results of many of these studies are contradictory, however, and it remains unclear as to which factors are responsible for the observed differences in mortality.

Delays in the diagnosis of breast carcinoma or in the initiation of breast carcinoma treatment may affect disease stage at presentation and influence survival, but there is disagreement regarding whether breast carcinoma survival and disease recurrence are related to the duration of symptoms or to the length of the delay in treatment initiation.[28–40] A metaanalysis performed by Richards et al.[41] indicated that a delay of 3–6 months between the appearance of symptoms and the initiation of treatment was associated with a lower survival rate than was a delay of < 3 months and that a delay of > 6 months was associated with a lower survival rate than was a delay of < 6 months.

To our knowledge, few studies have examined racial differences in breast carcinoma diagnosis and treatment, and the results of such studies are inconsistent.[2,36,39] Gregorio et al.[39] found no statistically significant difference between African American women and white women in terms of the interval between the appearance of symptoms and the initiation of treatment for breast carcinoma. Dennis et al.[36] found that African American women with breast carcinoma experienced a significantly longer delay between medical consultation and the initiation of treatment than did their white counterparts. Vernon et al.[2] observed a longer delay between recognition of symptoms and medical consultation among African American women with breast carcinoma compared with white women with breast carcinoma, although this difference did not account for differences in survival. Other investigators, however, have not found significant differences between African American women and white women in terms of the interval between symptom recognition and the seeking of medical attention[36] or the initiation of treatment.[39,40] A large multicenter study examined differences in the interval between symptom recognition and medical consultation as well as differences in the interval between medical consultation and the establishment of a diagnosis between African American women and white women ages 20–79 years who had newly diagnosed invasive breast carcinoma[42,43]; this study found a clinically insignificant but statistically significant difference in the former interval[42] but found no difference in the latter interval.[43]

In the current study, differences between African American women and white women ages 20–54 years who had newly diagnosed invasive breast carcinoma were examined. We analyzed differences in three intervals: the interval from physician consultation to biopsy-proven diagnosis, the interval from diagnosis to treatment initiation, and the interval from physician consultation to treatment initiation. In addition, using variables that have been analyzed or proposed as possible factors influencing such interval lengths, we examined the effects of demographic and socioeconomic characteristics, breast carcinoma screening, and tumor features on the racial differences that were observed.[36,39,42–48] To our knowledge, no other single published work has examined racial differences in the three delay intervals that we have described.

MATERIALS AND METHODS

Study Population

The patients included in the current study previously had been interviewed as part of a population-based case–control study of invasive and in situ breast carcinoma.[49] After being approved by the appropriate institutional review boards, the case–control study identified 950 African American or white women ages 20–54 years who had unilateral invasive breast carcinoma diagnosed between May 1, 1990, and December 31, 1992. These women resided in Cobb County, Fulton County, or DeKalb County, in the metropolitan area of Atlanta, Georgia. Case identification was performed via rapid ascertainment of hospital admission, surgery, and pathology records. Completeness of ascertainment was assessed by periodic verification against data from the Surveillance, Epidemiology, and End Results (SEER) cancer registry for metropolitan Atlanta. The data collection method is described elsewhere.[49]

The overall interview response rate for the case–control study was 87.9% (835 of 950 women), with response rates of 88.2% (584 of 662 women) and 87.2% (251 of 288 women) among white women and African American women, respectively. Thirty-four of the 950 women identified were not contacted (19 due to physician refusal, 11 due to illness, and 4 for other rea-

sons). Of the 916 women who were contacted, 81 were not interviewed (44 chose not to participate, 10 were in poor health, 5 had died, and 6 could not be located; the remaining 16 women were not interviewed for other reasons). For the current study, we excluded one additional woman who, following the initial study, self-reported her race as neither African American nor white; we also excluded three women who initially were interviewed as control patients and who subsequently were diagnosed with breast carcinoma. Thus, the current study included 831 women, 251 (30.2%) of whom were African American and 580 (69.8%) of whom were white.

Data Collection

Data collection for the original case–control study involved interviews, medical record review, and anthropometric measurements.[49] In each interview, the interviewee was asked to provide the date (month and year) on which she visited a physician regarding symptoms that eventually led to a diagnosis of breast carcinoma. Women also were asked about other conditions that were present before diagnosis and that may have influenced the time to medical consultation, diagnosis, or treatment for breast carcinoma.[36,39,42–48] In addition, women were asked to report their race as either white or African-American (these were the only races included in the current study) and to report whether they considered themselves to be of Hispanic ethnicity. Other sociodemographic characteristics on which data were obtained included age, education, marital status, annual household income, and number of persons supported by that income. Respondents also were asked about menopausal status, family history of breast malignancy, other medical conditions, usual adult bra cup size, access to health care (including history of mammography use), and health-related behaviors such as practice of breast self-examination (BSE) and cigarette smoking. Height and weight measurements were made by interviewers with training in anthropometry.

After institutional review board approval was granted for the follow-up study, we obtained information from the Atlanta SEER registry; conducted additional telephone interviews; and performed extensive medical record abstraction from hospitals, physician's offices, diagnostic and radiation facilities, and pathology laboratories. Ninety-nine percent of medical charts were successfully abstracted. We collected detailed data on initial diagnosis and treatment from records that were obtained from hospitals, physicians' (surgeons', medical oncologists', and radiation oncologists') offices, and pathology laboratories. Collected data included information on dates and types of biopsy procedures, surgical treatment, chemotherapy, and radiotherapy. Pathologic data obtained from biopsy specimens and resected specimens were recorded in detail and included information on tumor grade, hormone receptor status, and adequacy of surgical margins. From medical records, we obtained additional information on dates of initial medical consultation and subsequent treatment(s), comorbid conditions, insurance status, and disease stage. Abstractors regularly met with a study supervisor and a study investigator (J.W.E.) to reconcile any discrepancies in collected data. Ten percent of each abstractor's cases were reabstracted by another abstractor, and the original and second abstracts were compared to evaluate the quality of the data collection process. In the additional telephone interview, each woman was asked whether she had insurance at the time of diagnosis and, if so, what type of insurance she had. The SEER registry provided staging information (tumor size, lymph node status, and metastatic spread), as well as information on initial treatment courses (including treatment dates).

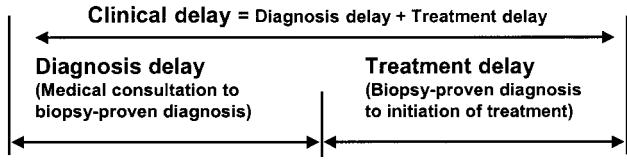

FIGURE 1. Description of the three delay intervals analyzed.

Outcome Variables

In the current study, we examined three outcome variables: diagnosis delay, treatment delay, and clinical delay (Fig. 1). *Diagnosis delay* was defined as the time between medical consultation and biopsy-proven diagnosis of invasive breast carcinoma. *Treatment delay* was defined as the time between biopsy-proven diagnosis and definitive surgery, initial neoadjuvant chemotherapy, or the initiation of chemotherapy or hormonal therapy for metastatic disease; determination of the 'initial treatment' was made by a medical oncologist (J.W.E.), who used the abstracted data when it was available and the SEER data in all other cases. *Clinical delay* encompasses both the diagnosis delay and treatment delay intervals and, thus, represents the time from medical consultation to the initiation of treatment.

For the calculation of diagnosis delay, the diagnosis date was obtained from medical records, and the delay interval was computed using the month and year of medical consultation that were reported in the interview, with the 15th day of the reported month

assigned as the date of consultation. Diagnosis delay categories of < 1 month, 1–2 months, and > 2 months were created; negative delay intervals were included in the < 1 month category. Diagnosis delay was divided into three categories because each of these categories contained a sufficient number of participants to allow the desired analysis. We dichotomized treatment delay into categories of < 1 month and ≥ 1 month, because few women had delays of > 2 months. Clinical delay was dichotomized into categories of < 3 months and ≥ 3 months, because a clinical delay of ≥ 3 months may influence patient survival.[41]

Predictors of Delay

In the current analysis, we used self-reported race rather than race listed in medical records. The limited number of Hispanic participants (0.8% of African American participants and 1.0% of white participants) precluded the examination of delay effects among Hispanic women; thus, we did not include ethnicity (Hispanic versus not Hispanic) in the current analysis. Insurance status was based primarily on information obtained from the additional telephone interviews, with this information supplemented by medical records. The *public insurance* category included only patients who were participating in a Medicaid or Medicare program. The *private insurance* category included patients participating in managed care plans, health maintenance organizations, or other group or private insurance plans. Poverty index was calculated based on a combination of annual household income and the number of people in that household who were supported by the income, with the annual household income divided by the 1991 national poverty level income for a family of the corresponding size.[50]

Menopausal status was categorized as either *premenopausal* or *postmenopausal*; the latter category included women with no ovarian function and women with unknown ovarian function status posthysterectomy. Women with unknown menopausal status were excluded from the analysis. Body mass index (BMI; weight [in kg] divided by height [in m] squared) was calculated using the anthropometric measurements from the initial case–control study.[51] Method of detection was divided into three groups: routine mammography, clinical breast examination, and self-detection. Self-detection methods included routine BSE, accidental self-detection, detection by a partner, and observation of symptoms leading to self-detection.

Disease stage at diagnosis was defined according to the recommendations of the American Joint Committee on Cancer. The third edition of this staging system was in use for the entire case ascertainment period (1990–1992).[52] Disease stage was ascertained during case abstraction by the study staff, and questions regarding staging were addressed in the regular meetings of the study staff with a study supervisor and a study investigator (J.W.E.). The disease stage reported by the study team was compared with the stage reported in the SEER database. A study investigator (J.W.E.) resolved all discrepancies by reviewing pathology reports, physician notes, operative reports, and staging forms found in medical records.

The comorbidity variable was based on information from the original interview (supplemented by medical records) and reflects only those conditions that were noted before breast carcinoma treatment. This variable represents the total number of comorbidities for a given patient and includes only conditions that were anticipated to have an effect on treatment and/or survival (e.g., diabetes, drug abuse, gastrointestinal disease, heart disease, human immunodeficiency virus infection, hypertension, renal disease, liver disease, lung disease, neuropathic disease, psychiatric disorders, and rheumatoid arthritis).

Other variables, including age, family history of breast malignancy, marital status, bra cup size, mammographic screening history, history of BSE, and smoking, were categorized as indicated in Table 1.

Data Analysis

We first examined differences in the three delay intervals (diagnosis, treatment, and clinical) by race and calculated 95% confidence intervals for the percentage of women in each delay category. We then examined differences between African American women and white women in terms of the socioeconomic, demographic, health-related behavioral, and health status variables that may contribute to racial differences in delay. Chi-square tests were used to assess the statistical significance of the associations between race and these variables. We considered any variable that exhibited a marginally significant association with race ($P < 0.20$) to be *potentially confounding*,[53] because even small race-based differences in these factors could contribute to or help explain racial differences in delay.

To determine whether a potential predictor of delay was related to a given delay measure, we again used the chi-square test and a threshold P value of 0.20. For each of the delay measures, predictors associated with both race and delay were examined in multivariable models to determine their effects on the relation between race and delay. Nominal logistic regression models were fitted to multinomial response variables; these analyses evaluated the odds that African American women had longer delays than did white women. The categories used in these analyses

TABLE 1
Characteristics Possibly Affecting Diagnosis Delay, Treatment Delay, and/or Clinical Delay in Women with Breast Carcinoma, by Race

Characteristic	No. of white patients (column %)	No. of African American patients (column %)	*P* value
All patients	580 (69.8[a])	251 (30.2[a])	
Age (yrs)			
20–34	37 (6.4)	42 (16.7)	<0.001
35–39	82 (14.1)	43 (17.1)	
40–44	143 (24.7)	75 (29.9)	
45–49	167 (28.8)	56 (22.3)	
50–54	151 (26.0)	35 (13.9)	
Menopausal status			
Premenopausal	395 (69.1)	165 (67.9)	0.745
Postmenopausal	177 (30.9)	78 (32.1)	
Education level			
No college degree	332 (57.2)	181 (72.1)	<0.001
College degree or more	248 (42.8)	70 (27.9)	
Poverty index			
<200	44 (7.8)	106 (43.4)	<0.001
201–350	88 (15.7)	55 (22.5)	
351–500	122 (21.7)	32 (13.1)	
501–700	121 (21.6)	27 (11.1)	
>700	186 (33.2)	24 (9.8)	
Insurance type			
Private	542 (95.6)	170 (79.4)	<0.001
Medicare or Medicaid	12 (2.1)	21 (9.8)	
None	13 (2.3)	23 (10.7)	
Marital status			
Married/living as married	402 (69.3)	107 (42.6)	<0.001
Not married	178 (30.7)	144 (57.4)	
Family history of breast malignancy			
None	447 (78.3)	200 (82.3)	0.311
Second-degree	43 (7.5)	18 (7.4)	
First-degree	81 (14.2)	25 (10.3)	
No. of mammograms in 5 yrs before diagnosis			
0	167 (28.8)	133 (53.2)	<0.001
1	103 (17.8)	46 (18.4)	
2	91 (15.7)	28 (11.2)	
3	64 (11.0)	16 (6.4)	
≥4	155 (26.7)	27 (10.8)	
Breast self-examination			
Never	138 (23.8)	48 (19.1)	0.020
<12 times per yr	182 (31.4)	64 (25.5)	
≥12 times per yr	260 (44.8)	139 (55.4)	
No. of comorbidities			
0	429 (74)	152 (60.6)	<0.001
1	127 (21.9)	69 (27.5)	
2	19 (3.3)	20 (8.0)	
3	5 (0.9)	10 (4.0)	
Smoking status			
Never smoked	270 (46.6)	148 (59.0)	0.001
Former smoked	233 (40.2)	68 (27.1)	
Current smoker	77 (13.3)	35 (13.9)	
Body mass index (kg/m^2)			
<25.0	357 (62.0)	76 (30.8)	<0.001
25.0–29.9	139 (24.1)	63 (25.5)	
>29.9	80 (13.9)	108 (43.7)	
Bra cup size			
A	70 (12.1)	16 (6.4)	0.010
B	282 (48.8)	124 (49.4)	
C	164 (28.4)	68 (27.1)	
D	62 (10.7)	43 (17.1)	
Method of detection			
Self-detection	379 (65.6)	207 (82.8)	<0.001
Clinical breast examination	65 (11.2)	27 (10.8)	
Routine mammography	134 (23.2)	16 (6.4)	
Lymph node status			
Negative	347 (62.0)	119 (51.5)	0.007
Positive	213 (38.0)	112 (48.5)	
Tumor size (cm)			
<1.0	130 (22.8)	35 (14.5)	<0.001
1–2	231 (40.5)	58 (24.1)	
2–5	179 (31.3)	115 (47.7)	
>5	31 (5.4)	33 (13.7)	
Disease stage at diagnosis			
I	266 (45.9)	63 (25.2)	<0.001
IIA	157 (27.1)	72 (28.8)	
IIB	87 (15.0)	53 (21.2)	
III or IV	69 (11.9)	62 (24.8)	

[a] Row percentage.

were the same as those used in the descriptive analyses. Along with race, each variable that was found to be potentially confounding was entered individually into the models for delay. For each delay measure, a set of variables that appeared to have the greatest influence on the relation between race and that measure was selected.[54] The final model included variables that altered the odds ratios according to race by at least 10% when added to a model including the other variables.

RESULTS

Most women, regardless of race, did not experience delays of > 2 months for the three measures that were examined (Fig. 2). Nonetheless, it appeared that African American women were more likely than white women were to have extended diagnosis, treatment, and clinical delays. The racial difference in clinical delay persisted up until the 12-month mark, at which point all women had begun receiving treatment (Fig. 3). Also, as depicted in Figure 3, the majority of white women and African American women had begun receiving some type of treatment for breast carcinoma within 3 months of the initial medical consultation. Nonetheless, 22.4% of African American women and 14.3% of white women experienced clinical delays of ≥ 3 months (Fig. 2).

In the current study, compared with white participants, African American participants were younger, more likely to be poor and to practice regular BSE, and less likely to be college educated, to have private health insurance, and to be married at diagnosis (Table 1). We observed no significant difference in menopausal status (which is likely to reflect participant age) or in family history of breast malignancy. Overall, compared with African American participants, white participants had fewer comorbidities, a lower BMI, and a smaller bra cup size and were more likely to be former smokers, to have received a mammogram in the 5 years before diagnosis, and to have had their malignancies detected by routine mammography. White participants also were more likely to be diagnosed with Stage I breast carcinoma and thus had smaller tumors with less lymph node involvement.

Many factors associated with race were also found to be associated with delay outcome on univariate analysis (data not shown). Diagnosis delay was associated with BSE habits and method of detection; treatment delay was associated with education level, poverty index, insurance status, marital status, mammography history, number of comorbidities, and bra cup size; and clinical delay was associated with insurance status, BSE habits, disease stage, and method of detection.

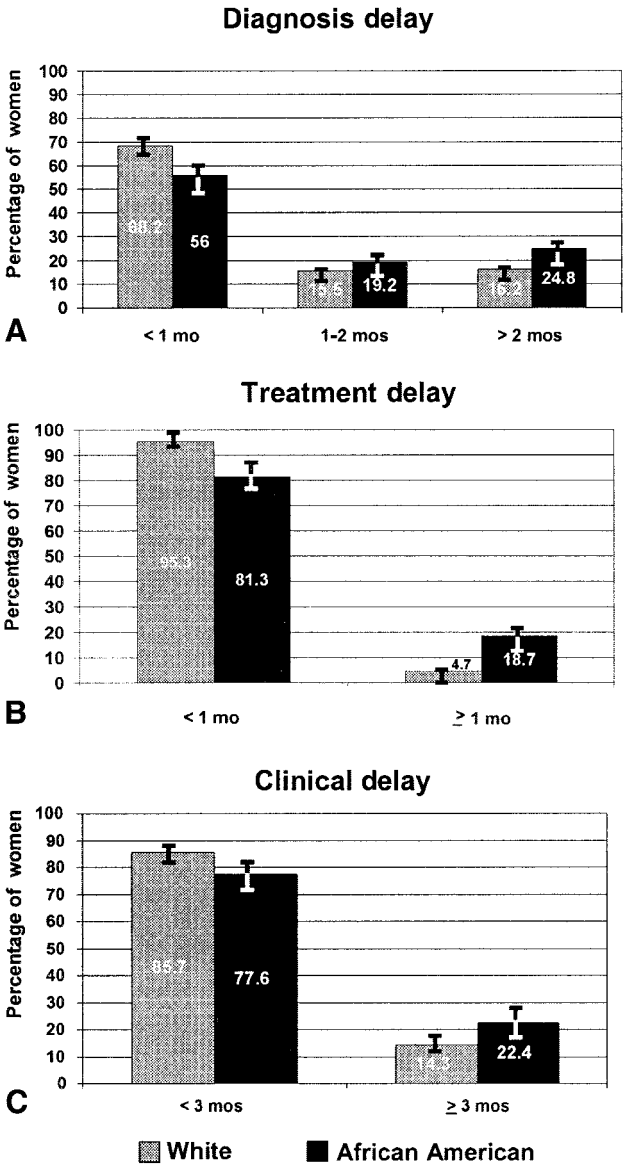

FIGURE 2. Delay interval data for African American women and white women with breast carcinoma. (A) Diagnosis delay. (B) Treatment delay. (C) Clinical delay.

Regression modeling indicated that for African American women, the odds of experiencing diagnosis delays of 1–2 months and > 2 months rather than a delay of < 1 month were 1.51 and 1.86 times, respectively, the corresponding odds for white women (Table 2). Method of detection appeared to reduce the odds of experiencing a diagnosis delay of > 2 months to some degree, but significant racial differences remained even after adjustment for this factor.

For African American women (relative to white women), the odds ratio for a treatment delay of ≥ 1 month versus a delay of < 1 month was 4.72 (Table 3).

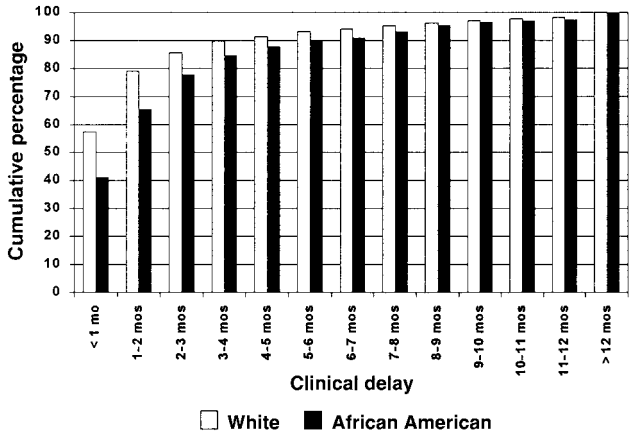

FIGURE 3. Cumulative percentages of African American women and white women who began breast carcinoma treatment within a given interval following their initial medical consultation.

TABLE 2
Odds of Diagnosis Delay[a] for African American Women Relative to White Women

	Odds ratio[b] (95% CI)	
Adjustment variable	1–2-month delay	>2-month delay
None	1.51 (1.01–2.25)	1.86 (1.28–2.71)
Method of detection	1.48 (0.99–2.24)	1.61 (1.10–2.36)

CI: confidence interval.
[a] *Diagnosis delay* was defined as the time from medical consultation to biopsy-proven diagnosis.
[b] For the specified delay versus a delay of <1 month. Odds ratios and 95% confidence intervals were derived from multinomial multiple logistic regression models.

TABLE 3
Odds of Treatment Delay[a] for African American Women Relative to White Women

Adjustment variable(s)	Odds ratio[b] (95% CI)
None	4.72 (2.86–7.78)
Poverty index	2.89 (1.61–5.20)
Insurance status	2.97 (1.69–5.20)
Marital status	4.14 (2.47–6.93)
Poverty index, insurance status, and marital status	2.34 (1.25–4.38)

CI: confidence interval.
[a] *Treatment delay* was defined as the time from biopsy-proven diagnosis to definitive surgery, initial neoadjuvant chemotherapy, or the initiation of chemotherapy or hormonal therapy for metastatic disease.
[b] For a delay of ≥ 1 month versus a delay of < 1 month. Odds ratios and 95% confidence intervals were derived from multinomial multiple logistic regression models.

TABLE 4
Odds of Clinical Delay[a] for African American Women Relative to White Women

Adjustment variable(s)	Odds ratio[b] (95% CI)
None	1.73 (1.18–2.52)
Insurance status	1.43 (0.94–2.19)
Method of detection	1.52 (1.04–2.23)
Mammography history	2.04 (1.37–3.03)
Insurance status, method of detection, and mammography history	1.53 (0.98–2.39)

CI: confidence interval.
[a] *Clinical delay* was defined as the time from medical consultation to definitive surgery, initial neoadjuvant chemotherapy, or the initiation of chemotherapy or hormonal therapy for metastatic disease.
[b] For a delay of ≥3 months versus a delay of <3 months. Odds ratios and 95% confidence intervals were derived from multinomial multiple logistic regression models.

Adjustment for poverty index and insurance status reduced this odds ratio substantially, and adjustment for marital status had a similar but more modest effect, but racial differences still were present after these factors were accounted for.

The odds ratio associated with a clinical delay of $\geq$ 3 months versus $<$ 3 months for African American women compared with white women was 1.73 (Table 4). Although adjustment for method of detection and mammography history reduced this ratio substantially, it was insurance status that appeared to have the greatest impact on clinical delay. Adjustment for these three factors resulted in a reduction of the odds ratio for African American women to 1.53, which was no longer statistically significant (95% confidence interval, 0.98–2.39).

DISCUSSION

The literature regarding the effects of treatment delay and duration of symptoms on survival in patients with breast carcinoma contains conflicting findings,[28–40] but the metaanalysis performed by Richards et al.[41] concluded that a delay of 3–6 months from symptom recognition to the start of treatment was associated with a lower survival rate than was a delay of $<$ 3 months and that a delay of $>$ 6 months was associated with a lower survival rate than was a delay of $<$ 6 months. The majority of women in the current study began treatment within 3 months of their initial consultation; however, approximately 22% of African American women and 14% of white women had delays of $\geq$ 3 months between consultation and treatment, a finding that raises the possibility that delays in the provision of medical care may have been clinically significant.

In contrast to an earlier study conducted by Caplan et al.,[43] who reported a small but statistically insignificant difference (of approximately 4 days) between African American women and white women in terms of the time from medical consultation to diag-

nosis of breast carcinoma, the current study found a statistically significant difference in diagnosis delay according to race. Reasons for the discrepancy between these two studies are unclear. Caplan et al. investigated delay among women ages 25–79 years who lived in Atlanta; San Francisco/Oakland, California; or New Orleans, Louisiana; and who were diagnosed between 1985 and 1986. In that study, results for younger women living in Atlanta were not presented separately, but overall, younger women had longer delays than did older women, and among women age $<$ 60 years, the delay was somewhat longer for white women compared with African American women. The only factor in the current analysis that appeared to contribute to racial differences in diagnosis delay was the method of breast carcinoma detection, and statistically significant differences remained after adjustment for this factor. In light of the findings made by Caplan et al.[43] (in the only other published study, to our knowledge, to examine this issue), our findings suggest that racial differences in diagnosis delay may be found in some U.S. populations and not in others, depending on geographic location and the time period in which the diagnosis was made, and possibly on the method of breast carcinoma detection. The observed racial differences in diagnosis delay remain largely unexplained in both of these studies, although method of detection may contribute to these differences to some extent.

To our knowledge, no published study to date has examined the differences between African American women and white women in terms of the time between breast carcinoma diagnosis and treatment initiation. Thus, our observation of a racial difference in treatment delay is novel.

The results regarding clinical delay (i.e., the time from medical consultation to treatment) in the current study are consistent with the results of the only other published study to examine this issue[36]: delays were greater for African American women than for white women in both studies. Dennis et al.[36] examined the clinical delay interval for 237 women ages 23–81 years who underwent radical mastectomy at a New York hospital between 1965 and 1970, but they did not examine factors other than race and age. In the current study, insurance status appeared to contribute substantially to the observed racial differences.

To our knowledge, the current investigation represents the first single study of the differences between African American women and white women in terms of diagnosis delay, treatment delay, and the combination of diagnosis and treatment delays (i.e., clinical delay). The study had a number of strengths: it was a population-based analysis, response rates were good, and information on several factors that may have affected delay intervals was collected. Nonetheless, limitations also were present. Assuming that medical consultation occurred on the 15th day of the month reported by each participant may have introduced random error into our measurements of diagnosis delay and clinical delay, although this probably was not a source of bias in the comparison of African American women with white women. In addition, the study population was relatively small, which limited our power to detect differences in delay.

Several factors also may have affected the generalizability of our results. For example, all participants were diagnosed during the early 1990s in a single metropolitan area, so findings may reflect temporal and regional variations in health care as well as temporal and regional differences in socioeconomic and cultural factors. Furthermore, the women in the current study were relatively young (ages 20–54 years). Whether similar delays would be observed among older women is unclear, particularly because older women may be more likely to have tumors detected during screening.

Although most women in the current study were treated within 3 months of diagnosis, some were treated long enough after their initial medical consultation that prognosis may have been affected. Our findings, combined with the limited information found in the literature, indicate the presence of racial differences in time from consultation to treatment and the possible presence of racial differences in time from consultation to diagnosis. It is likely that racial differences in medical delay intervals vary among U.S. sub-populations other than the one examined here. Some of the observed differences appear to be attributable to racial differences in socioeconomic circumstances (poverty index) and access to care (as represented by insurance status and method of detection); thus, improvements in health insurance coverage may help to reduce racial differences in medical delays involving breast carcinoma. Not all differences were attributable to commonly proposed explanatory factors, however, and further research is necessary to determine in which populations and under what conditions racial differences in medical care delays are found and to better elucidate the reasons for such differences. Identification of these reasons may require additional qualitative research.

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